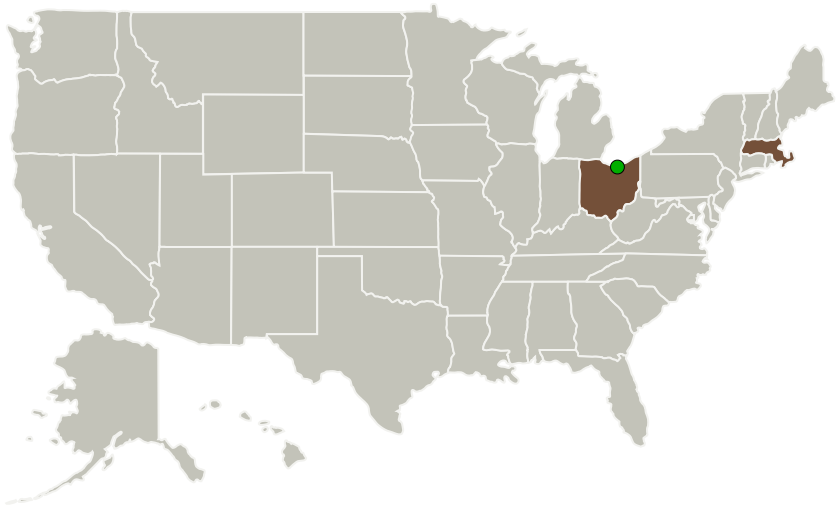
Aspirated Compressors for High Altitude Engines, Phase I

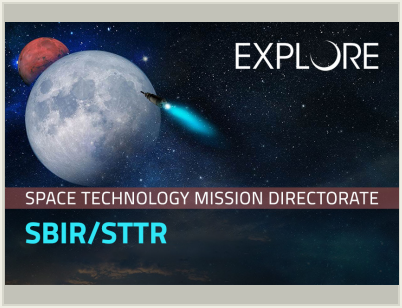
Completed Technology Project (2010 - 2010)

Project Introduction

Aurora Flight Sciences proposes to incorporate aspirated compressor technology into a high altitude, long endurance (HALE) concept engine. Aspiration has been proven to increase the stage loading of gas turbine compressors and fans, potentially allowing weight reduction through the reduction of compression stages or through the reduction of stresses through decreased spool speeds. Additionally, aspiration has the potential to increase the low Reynolds number capability of an engine through improved control of the viscous boundary layer. Low Re capability is important for the performance of high altitude engines operating in low density air, as well as of lower power, micro-scale engines. Although the component level benefits of aspiration have been experimentally verified and the design techniques established, the issues surrounding the integration of the technology in an engine system have yet to be adequately addressed. The performance benefit of aspiration to an engine system will depend on the details of how bleed air from the compressor is utilized elsewhere in the engine cycle. The maximum benefit of the technology will also depend on the net weight reduction achievable once all supporting subsystems are taken into account. Aurora proposes to investigate the interdependences between aspiration flow requirements, weight reduction, and overall cycle efficiency as part of an optimization effort to maximize the capability of a HALE engine. The effort will define the benefits of compressor aspiration in a low Reynolds number environment and provide the rational for using the HALE mission as a launch application for this promising technology.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Massachusetts	Ohio

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138823)*

Project Management

Program Director:

Jason L Kessler

Program Manager:

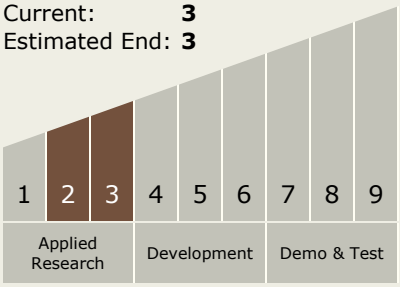
Carlos Torrez

Principal Investigator:

Nathan Fitzgerald

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.3 Aero Propulsion
    - TX01.3.4 Pressure Gain Combustion

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System